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What is claimed is:

1. A peptide or protein useful in the diagnosis, treatment or prophylaxis of a disease caused by a coronavirus or related virus comprising a selected sequence from the S gene of a coronavirus strain, optionally fused in frame to a gene sequence encoding a selected fusion partner protein or portion thereof.

2. The protein according to claim 1 wherein the S gene is obtained from the feline coronavirus, Feline Infectious Peritonitis Virus.

3. The protein according to claim 1 wherein said coronavirus is selected from the group consisting of WT FIPV DF2, WT FIPV WSU 1146, TS FIPV, WT FIPV UCD-2, WT FIPV TN406, WT FIPV UCD-1, FIPV DF2-HP, and FIPV TS-BP.

4. The protein according to claim 1 wherein the S gene is obtained from the feline coronavirus, FECV.

5. The protein according to claim 1 wherein said selected S gene sequence encodes a peptide comprising a sequence homologous to amino acid numbers 1-1454 of the said S protein, or a fragment thereof.

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6. The protein according to claim 5 wherein said selected S gene sequence encodes a peptide comprising a sequence homologous to amino acid numbers 1-748 of said S protein, or a fragment thereof.

7. The protein according to claim 1 wherein said selected S gene sequence encodes a peptide comprising amino acid numbers 94-223 of said S protein.

8. The protein according to claim 1 comprising a peptide selected from the group consisting of amino acid numbers 18 - 26 [SEQ ID NO: 36], 46 - 53 [SEQ ID NO: 38], 73 - 78 [SEQ ID NO: 40], 124 - 174, 145 - 150 [SEQ ID NO: 42], 138 - 159 [SEQ ID NO: 44], 143 - 150 [SEQ ID NO: 46], 200 - 205 [SEQ ID NO: 48], and 529 - 536 [SEQ ID NO: 50] from FECV, corresponding peptides of FIPV, corresponding peptides of the consensus sequence, and fragments thereof, said peptides capable of distinguishing between FIPV strains and FECV.

9. The protein according to claim 1 wherein said selected fusion partner protein is selected from the group consisting of galactokinase, beta-galactosidase, ubiquitin, α mating factor, and influenza NS-1 or portions thereof.

10. The protein according to claim 9 wherein said selected fusion partner protein comprises the N-terminal 52 amino acids of galactokinase.

11. A peptide or protein useful in the diagnosis, treatment or prophylaxis of Feline Infectious Peritonitis Virus comprising a selected sequence from the S gene of a feline coronavirus strain, optionally fused in frame to a galactokinase gene or the N terminal 52 amino acids thereof.

12. A peptide or protein comprising all or a portion of the amino acid sequences selected from the group consisting of the amino acid sequences of Figure 3 SEQ ID NO: 20, Figure 4 SEQ ID NOS: 22 and 24, Figure 5 SEQ ID NOS: 26 and 28, Figure 6 SEQ ID NO: 30, Figure 7 SEQ ID NO: 32, Figure 8 SEQ ID NO: 54, and Figure 9 SEQ ID NO:34.

13. A DNA sequence useful in the diagnosis, treatment or prophylaxis of a disease caused by a coronavirus or related virus comprising a selected nucleotide sequence from the S gene of a feline coronavirus strain.

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14. The DNA sequence according to claim 13 wherein the S gene is obtained from the feline coronavirus, Feline Infectious Peritonitis Virus.

15. The DNA sequence according to claim 13 wherein said coronavirus is selected from the group consisting of WT FIPV DF2, WT FIPV WSU 1146, TS FIPV, WT FIPV UCD-2, WT FIPV TN406, WT FIPV UCD-1, FIPV DF2-HP, and FIPV TS-BP.

16. The DNA sequence according to claim 13 wherein the S gene is obtained from the feline coronavirus, FECV.

17. The DNA sequence according to claim 13 comprising a sequence spanning nucleotides 1 to about 4365 of said S gene, or fragments thereof.

18. The DNA sequence according to claim 17 comprising a sequence spanning nucleotide numbers 1 to 2246 of said S gene, or a fragment thereof.

19. The DNA sequence according to claim 17 comprising a sequence spanning nucleotide numbers 1-370 of said S gene, or a fragment thereof.

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20. The DNA sequence according to claim 13 selected from the group consisting of FECV nucleotide numbers 52 - 78 [SEQ ID NO: 35], 136 - 159 [SEQ ID NO: 37], 214 - 231 [SEQ ID NO: 39], 370 - 519 [SEQ ID NO: 41], 433 - 450 [SEQ ID NO: 43], 412 - 477 [SEQ ID NO: 45], 427 - 450 [SEQ ID NO: 47], 598 - 615 [SEQ ID NO: 49], and 1585 - 1608 [SEQ ID NO: 51] corresponding sequences of FIPV, corresponding sequences of the consensus sequence and fragments thereof, said sequences capable of distinguishing between FIPV strains and FECV.

21. A DNA sequence useful in the diagnosis, treatment or prophylaxis of Feline Infectious Peritonitis Virus comprising a selected sequence from the S gene of a feline coronavirus strain, optionally fused in frame to a DNA sequence encoding the galactokinase gene or the N terminal 52 amino acids thereof.

22. A DNA sequence comprising all or a portion of the nucleotide sequences selected from the group consisting of the amino acid sequences of Figure 3 SEQ ID NO: 19, Figure 4 SEQ ID NO: 21 and 23, Figure 5 SEQ ID NO: 25 and 27, Figure 6 SEQ ID NO: 29, Figure 7 SEQ ID NO: 31, Figure 8 SEQ ID NO:53, and Figure 9 SEQ ID NO: 33.

23. A method for production of a recombinant protein useful in the diagnosis, treatment or prophylaxis of diseases caused by feline coronaviruses comprising culturing a selected host cell transformed with a DNA sequence encoding a selected sequence from the S gene of a feline coronavirus strain, optionally fused in frame to a gene sequence encoding a selected fusion partner in operative association with regulatory sequences capable of regulating the expression of said protein.

24. The method according to claim 23 wherein said fusion partner protein is selected from the group consisting of galactokinase, beta-galactosidase, ubiquitin, α mating factor, and influenza NS-1 or portions thereof.

25. The method according to claim 23 wherein the feline coronavirus is Feline Infectious Peritonitis Virus.

26. The method according to claim 23 wherein the feline coronavirus is FECV.

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27.   The method according to claim 23 wherein selected sequence comprises a peptide selected from the group consisting of amino acid numbers 18 - 26 [SEQ ID NO: 36], 46 - 53 [SEQ ID NO: 38], 73 - 78 [SEQ ID NO: 40], 124 - 174, 145 - 150 [SEQ ID NO: 42], 138 - 159 [SEQ ID NO: 44], 143 - 150 [SEQ ID NO: 46], 200 - 205 [SEQ ID NO: 48], and 529 - 536 [SEQ ID NO: 50] from FECV, corresponding peptides of FIPV, corresponding peptides of the consensus sequence, and fragments thereof, said peptides capable of distinguishing between FIPV strains and FECV.

28.   The method according to claim 23 wherein said cells are bacterial cells.

29.   The method according to claim 23 wherein said cells are E. coli cells.

30.   The method according to claim 23 further comprising separating said coronavirus S fusion protein by affinity chromatography using monoclonal antibodies to said fusion partner protein or portion thereof.

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31.   A recombinant DNA molecule comprising a DNA
sequence coding for a selected portion of a feline
coronavirus S gene, optionally fused in frame to a DNA
sequence encoding a selected portion of a fusion partner
protein, said DNA sequences in operative association with
regulatory sequences capable of directing the expression
thereof in host cells.

32.   The molecule according to claim 31 wherein said
fusion partner protein is galactokinase, the N-terminal
52 amino acids thereof, beta-galactosidase, ubiquitin, α
mating factor, and influenza NS-1 or portions thereof.

33..   The molecule according to claim 31 wherein said
DNA sequence is selected from the group consisting of
FECV nucleotide numbers 52 - 78 [SEQ ID NO: 35], 136 -
159 [SEQ ID NO: 37], 214 - 231 [SEQ ID NO: 39], 370 - 519
[SEQ ID NO: 41], 433 - 450 [SEQ ID NO: 43], 412 - 477
[SEQ ID NO: 45], 427 - 450 [SEQ ID NO: 47], 598 - 615
[SEQ ID NO: 49], and 1585 - 1608 [SEQ ID NO: 51],
corresponding sequences of FIPV, corresponding sequences
of a consensus sequence, and fragments thereof, said
sequences capable of distinguishing between FIPV strains
and FECV.

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34. The molecule according to claim 31 comprising pOTSKF33.

35. A galactokinase-feline coronavirus S fusion protein gene expression unit comprising a DNA sequence encoding said protein, and a regulatory sequence capable of directing the transcription of the protein coding sequence and subsequent translation within a bacterial cell.

36. A vaccine composition comprising an immunogenic amount of a feline coronavirus protein comprising a selected sequence from the S gene of a feline coronavirus strain, optionally fused in frame to a gene sequence encoding a selected fusion partner protein or portion thereof and an optional carrier.

37. The vaccine composition according to claim 36 wherein said fusion partner comprises the first 52 N-terminal amino acids of galactokinase.

38. The vaccine composition according to claim 36 comprising at least 1-10 feline coronavirus S fusion proteins per ml.

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39.   The vaccine composition according to claim 36 further comprising an immunogenic amount of one or more additional antigens.

40.   The vaccine composition according to claim 39 wherein said additional antigens are feline antigens.

41.   The vaccine composition according to claim 39 wherein said feline antigens are coronaviruses.

42.   The vaccine composition according to claim 37 further comprising a temperature sensitive FIPV antigen.

43.   The vaccine composition according to claim 37 comprising a dosage unit of 0.1 μg to 100 μg per ml of a sterile solution of an immunogenic amount of a galactokinase-feline coronavirus S protein, optionally fused in frame to a gene sequence encoding a selected fusion partner protein or portion thereof.

44.   A method for vaccinating a naive animal against Feline Infectious Peritonitis Virus which comprises internally administering to the animal an effective immunogenic amount of a protein according to claim 1.

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45. A method for vaccinating a naive animal against Feline Infectious Peritonitis Virus which comprises internally administering to the animal a vaccine composition of claim 42.

46. A pharmaceutical composition for treating Feline Infectious Peritonitis Virus infection in an infected animal comprising an effective non-toxic amount of a feline coronavirus protein comprising a selected sequence from the S gene of a feline coronavirus strain, optionally fused in frame to a gene sequence encoding a selected fusion partner protein or portion thereof and an optional pharmaceutical carrier.

47. A diagnostic kit for distinguishing between native FIPV exposure and vaccinated animals and between first and second FIPV exposure in FIPV-infected animals comprising a protein according to claim 1 or a DNA sequence according to claim 13.

48. A diagnostic agent comprising a protein of claim 1, a primer sequence of Table II (SEQ ID NO: 1 through SEQ ID NO: 18), or a DNA sequence according to claim 13, optionally associated with a detectable label, said agent capable of detecting a selected coronavirus in a biological sample.

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49.   A method for distinguishing one coronavirus from another coronavirus, including one species coronavirus from another species coronavirus, comprising employing a protein of claim 1, a primer sequence of Table II (SEQ ID NO: 1 through SEQ ID NO: 18), or a DNA sequence according to claim 13.

50.   An antibody to a peptide or protein according to claim 1, said antibody capable directed to an epitope capable of distinguish FIPV strains and FECV.